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ABSTRACT

An 8-day unit introduces middle school students to American inventors and inventions. In separate lessons, students examine the patenting process, women inventors, minority inventors, Native American inventors, the airplane, Thomas Edison, and the impact of inventions on America's growth. A brief outline of daily lesson plans precedes a section of class readings and student activity sheets. Worksheets consist primarily of matching, true and false, and question and answer exercises to measure students' understanding of materials covered. A section of supplementary materials includes a Morse code activity and tips on setting up a learning center. The document is one of a collection of materials from the Iowa Area Education Agency 7 Teacher Center Project. (LP)

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Inventors and Inventions

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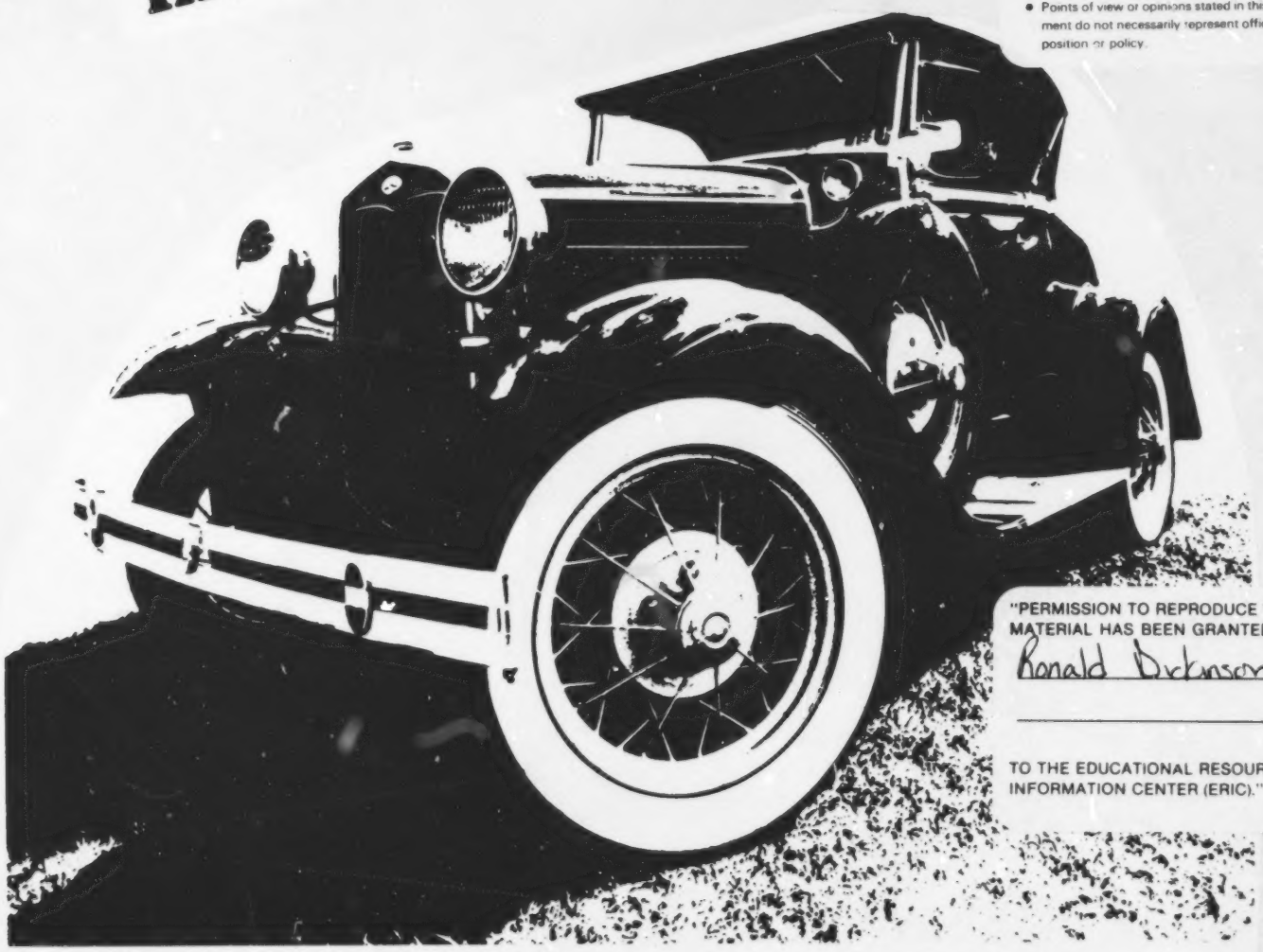

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Teacher Center Director - Diane Gibson, Ed. D.

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INVENTORS AND INVENTIONS UNIT

SUGGESTED DAILY LESSON PLANS:

DAY ONE

1st 10': Introduce the unit (why we study this area of history; what we will be doing; etc.).

15': Issue the Test Your Creativity sheet. . . give an example of what's to be done . . . let them work on this about 15'. . then, discuss the answers.

15': Hand out the Pre-Test. . . answer and discuss each for understanding.

15': Show the film, To Be Creative (Area 7)

DAY TWO

1st 30': Have each student read and/or take notes on the main reading on Patents and Inventions. Explain that this will comprise the majority of post-test questions.

Last 20': Discuss main points of the reading and have the students do, Could It Be Patented?
Check and explain the answers.

DAY THREE

1st 10': Teacher-led discussion of America's great inventors. Allow students to volunteer their choices. . . and give their reasons for selecting that inventor.

10': Teacher-led discussion of the role all inventors have played in contributing to American life (this would be a good time to talk of local inventors).

10': Issue and assign the readings, Famous Women Inventors and Famous Black Inventors.

15': Hand out the quiz over the readings . . . allow a few minutes to complete. . check and discuss the answers.

Follow this by issuing the enrichment activity, American Inventors Who Were Immigrants and Inventors With Unusual Inventions. Allow them to research these and make them due later in the unit.

DAY FOUR

1st 25': Explain and show the film, Patent Pending (Area 7)

5-10': Have the students list the 5 senses. . . then, have them volunteer their information.

15-20': Issue the Perception reading. . . after they have read through it, ask them the Perception questions which go with it.

DAY FIVE

1st 15': Issue the reading on Native American Inventors. After they've read through it allow them time to work out the Navajo code. They can check with you when they have the solution.

25': Show the film, Sensory World (Area 7)

10': Issue What Do You See? . . check their answers before leaving (orally).

DAY SIX

1st 30': Issue the reading and worksheet, Kittyhawk Floats Across North America and Incredible Machine.

For extra credit (early finishers). . have them work on the Time-Line activity.

Last 10-15': Check the main reading worksheet plus the Time-Line activity.

DAY SEVEN

1st 15': Introduce and show the film, Edison-Persistent Genius (Area 7)

20': Issue the reading, The Wizard of Menlo Park - give the 8-point quiz following the reading and check.

10-15': Teacher have the clue game, Name the Inventor or Invention (give extra credit to the students who guess them first)

DAY EIGHT

1st 15': Show film, Inventions in America's Growth (Area 7)

Last 40': Post-test over the unit. Allow students to use their notes.

Other Activities that can be used during the Unit:

1. Matching: Transportation Achievements
2. Labor-Saving Device Activity
3. Reading and worksheet, Birth and Babyhood of the Telephone
4. Reading and worksheet, A Genius. . .
5. Enrichment work-Learning Center
6. Morse Code Activity

NAME_____

CLASS_____

Test Your Creativity

Play this simple word game that requires unusual associations.

Fill in the blank space with a word that the three given words have in common. For example, the answer to number one is bath - creating bathrobe, steam bath, birdbath.

1.	robe	steam	bird _____	11.	hut	skirt	roots _____
2.	book	post	tour _____	12.	table	court	elbow _____
3.	fly	shoe	radish _____	13.	line	light	dress _____
4.	dew	bee	comb _____	14.	end	shelf	maker _____
5.	bag	coffee	stalk _____	15.	hole	brake	servant _____
6.	key	wall	cold _____	16.	hop	pool	cable _____
7.	leaf	berry	window _____	17.	line	busy	spelling _____
8.	up	hot	life _____	18.	fore	bowl	painting _____
9.	down	stone	golden _____	19.	day	house	weight _____
10.	cake	blue	cottage _____	20.	made	cuff	left _____

Analysis - Creativity is often defined as combining the practical with the original - forming new combinations of old elements. There are many interesting tests that psychologists use to measure creativity. This is one of them. Coming up with 20 common, practical words to fill in the blanks can be fun and also tell you something about your own mind leaps.

Scoring - Count one point for each correct answer. If you score is over 16, or 80 percent correct, you're among the creative elite. But take heart if you scored less. Comic strip creators scored higher than research scientists on a similar test.

NAME_____

CLASS_____

ANSWER SHEET: TEST YOUR CREATIVITY

1. Bath
2. Mark-Guide
3. Horse
4. Honey
5. Bean
6. Stone
7. Bay
8. Line
9. Touch
10. Cheese
11. Grass
12. Tennis
13. Up/Head
14. Book
15. Man
16. Car
17. Bee
18. Finger
19. Light
20. Hand

NAME_____

CLASS_____

INVENTORS AND INVENTIONS UNIT

PRETEST DIRECTIONS: Choose the best answer to the following multiple-choice questions -

_____ 1. What is the protection called on your new invention so that you have exclusive rights to it?

a. a copyright b. a patent c. a trademark d. a royalty

_____ 2. Which man invented the telephone?

a. Alexander Graham Bell b. Thomas Edison c. Henry Ford d. Wilbur Wright

_____ 3. What document indicates the exclusive rights you have on an invention of yours?

a. Bill of Rights
b. Declaration of Independence
c. Constitution
d. Magna Carta

_____ 4. Which of the following is not one of the 5 senses?

a. sense of touch
b. sense of taste
c. sense of hearing
d. sense of balance

_____ 5. Which is the most inventive nation in the world (in terms of total new inventions submitted yearly)?

a. United States b. Germany c. Japan d. Russia

_____ 6. In what area are new inventions greatly encouraged?

a. automobile industry
b. petroleum industry
c. energy and environment
d. science and technology

_____ 7. Which is not a requirement to be met in order to call your idea an invention?

a. must be useful
b. must be unique
c. must be cheap to make
d. can be a new use of an old device

_____ 8. Which man invented, among other things the electric light bulb?

a. Alexander Graham Bell b. Thomas Edison c. Henry Ford d. Wilbur Wright

_____ 9. How long is your invention protected when you receive exclusive rights to it?

a. 5 years b. 7 years c. 10 years d. 17 years

_____10. Which is least needed to have in order to be an inventor?

a. good job b. creativity c. an imagination d. persistence

NAME _____

CLASS _____

Answer Sheet: INVENTION PRE-TEST

1. B
2. A
3. C
4. D
5. A
6. C
7. C
8. B
9. D
10. A

INVENTORS AND INVENTIONS

In early times inventors were given recognition for their achievement. These creative people were not protected by any law which gave them exclusive rights to their invention. Because of this anyone could copy what they had so painstakingly discovered and reap the benefits of its production and sales.

America had only been colonized for a short time when an English patent law was passed to protect prospective inventors. The first person to capitalize on this was Samuel Winslow in 1641. He was issued the first American colonial patent on a new procedure for extracting salt. Following American independence from England in 1776 our fore-fathers met to write a Constitution, or system of government for the thirteen colonies. Article I, Section 8 of the Constitution gave "Congress the power . . . to promote the progress of science and useful arts, by securing for limited times to . . . inventors the exclusive right to their discoveries." With this, the first United States Government patent was issued to Samuel Hopkins in 1790. He had made an improvement in the production of potash.

A patent is a grant issued by the U.S. Government giving the investor **sole** rights to the making, using, and selling of the product within the United States, its territories and possessions. This protection lasts for 17 years. To protect your idea and avoid piracy you may contact:

The International Register of Ideas
663 Fifth Avenue,
New York City, New York 10022

A patent is not to be confused with a copyright or trademark. A copyright protects printed material from being copied for 7 years. . . examples would be a songsheet or a book. Trademarks are brand names used on goods. This distinguishes one person's goods from another and protects the owner for 20 years.

An inventor cannot wait indefinitely to record a patent on the new product. In fact, there is a time limit for filing patent applications; within 12 months of its first use. The average waiting time for approval is 19 months. If approved, you pay an issue fee of $100 or more, plus printing charges. Any product that you see with the words, Patent Pending, stamped on it means that the patent has been applied for. The Patent Office has a right to investigate your invention to see that it is original and that it is safe to use.

If you have the time, you might conduct a Patent Search, to see if no one else has already recieved a patent on your idea. You may search through over 4,000,000 patents in the Patent Research Room in Arlington, Virginia. This is a block-long repository where all patents are divided into 309 classes and 66,000 sub-classes. The U.S. Patent and Trademark Office has 9,000 licensed patent agents and attorneys who can help you conduct a patent search. The average charge runs between $1200 to $1500. Needless to say, building and selling your invention may cost you thousands of dollars to get started.

Two up-to-date addresses you may contact for applying for a patent are:

Commissioner of Patents
Washington, D.C. 20231
or,
U.S. Government Printing Office
Washington, D.C. 20402

Ask for the guide to Patents and Inventions. There may be a small fee for postage and handling.

It is interesting to note that Americans seem to be inventing more products than ever before.

Patent #1 Million was granted in 1911 (121 years: 1790-1911).
Patent #2 Million was granted in 1935 (24 years: 1911-1935).
Patent #3 Million was granted in 1961 (26 years: 1935-1961).
Patent #4 Million was granted in 1976 (15 years: 1961-1976).

Number 4 million was granted on December 28, 1976, to Robert Mendenhall of LasVegas, Nevada. He invented a process for recycling asphalt paving material.

Today, Americans average turning in over 80,000 patents a year which is about 1 for every 3,800 people. It is a little alarming to discover, however, that foreigners (in the last five years) have received 1/3 of all U.S. patents issued. Are we getting lazy or are they getting more creative and ambitious?

If your invention would arrive at the Patent Office and a similar invention would arrive at the same time; you will have to prove that you had the idea first. Therefore, keep accurate records of your work history and be prepared to show them in court. A classic example of this is the invention of the telephone. Alexander Graham Bell and Elisha Gray submitted their plans for the phone at the same time. The issue went to court and Mr. Bell won out because he had more complete records to verify his claims. Our phone system could very well have been called Gray Telephone today if Elisha had been more convincing.

People have become rich on their inventions. One sure-fire bet would be Mr. Rubik, the inventor of the famous cube game. Millions have been sold all over the world. Your chances of striking it rich are slim, however. In 1975, for example, 71,994 patents were granted of which 24% were granted to individuals. Of this, 5% got to the marketplace and only 1% (about 720) returned a profit.

Today, the field given the most priority is in the realm of energy and environmentally-related inventions. We are an energy-conscious nation. Already, the National Bureau of Standards has evaluated 11,000 inventions in the last few years under a program to promote energy-related devices. Requests continue to pour in at the rate of 15 to 20 per day. Of the 11,000 evaluated only 111 (or 1.3%) were recommended for further study. To be accepted the device must work, use non-nuclear power, be able to save the energy supply and be salable.

If you want to invent something to save energy, the Government will test it free of charge. Both patented and unpatented inventions are eligible. The inventor retains all rights to his product and is guaranteed complete confidentiality. Inventors interested in this program can obtain more information by writing:

Office of Energy-Related Inventions
National Bureau of Standards
Washington, D.C. 20234

or

ERDA Office of Public Affairs
Washington, D.C. 20545

Ask for an evaluation request form, #NBS-1019.
Finally, remember that there are requirements to be met before you may receive a patent.
First, it must be unique (no one has done it before).
Second, it must be useful.
Third, it must be an invention (not printed matter).
Fourth, it may be granted (since 1952,) if it is a new use of an old device (like a better mousetrap, for example).

Here are some tips to get your idea off the drawing board by Donald Studley, a succesful amateur inventor:

1. Draw your idea on paper.
2. Make a prototype of your invention.
3. Try to make a functioning unit.
4. Show the prototype to people to get an initial reaction.
5. Take the prototype to an appropriate retail store and show it to the manager. They will give you valuable feedback on the marketability of your unit.
6. If initial feedback is positive, shop for venture money.
7. Once financing is obtained, make a finished-looking working prototype.
8. Exhibit your item at an appropriate trade show. You will get immediate reaction from the people who matter - store buyers.
9. Based on the trade's reaction, either start producing your item and taking orders or go back and incorporate the suggestions of buyers to improve upon your idea.

GOOD LUCK ON YOUR VENTURE!

NAME_____

SECTION_____

ACTIVITY: "COULD IT BE PATENTED?"

Directions: Knowing the requirements which must be next in order to patent an invention, decide if the following devices would qualify. If they don't, explain what criteria was not met:

I. You have made an improved design for a stagecoach. It could/could not (circle one)

be patented because:_____

_____.

II. You have an idea for a foolproof burglar alarm.

III. You have plans for an untested machine which will turn iron into gold.

IV. You have successfully developed a new variety of an apricot.

V. You have invented a writing device consisting of a wooden tube with a stick of graphite bonded into the center.

VI. You have constructed a mechanism for boosting fuel mileage in cars.

ANSWER KEY:

I. No. . . . a stagecoach is no longer useful now that people travel in cars and the like.

II. No . . you cannot patent ideas. The invention has to be shown that it will work.

III. No. . it is extremely unlikely that it would work.

IV. Yes . . new kinds of plants that reproduce can be patented.

V. No. . it 's not new since the lead pencil has already been invented.

VI. Yes. . as long as no one else has patented the same device . . . or one very much like it.

INVENTORS AND INVENTIONS UNIT

"Famous Women Inventors"

Women throughout the world have contributed much to the world of science and technology. Probably the most widely acclaimed contributor would be the efforts of Marie Curie. Marie was born in Warsaw, Poland in 1867 but moved to Paris, France in her late teens. Here she would attend the University of Paris to study. Miss Curie took the master's exam in physics and emerged with the highest score in her class.

Following graduation, Marie began to work in the field of radiation and after years of research, discovered two new elements - polonium and radium. It took four more years of hard work to get one small sample of radium.

In 1903, Marie won the Nobel prize in physics for the discovery of radioactive elements. She was the first woman to ever receive this honor.

In 1911, Madame Curie received her second Nobel Prize; this time in chemistry. No other person has ever received two Nobel awards in science.

In her later years, Marie continued to work on her research with radioactive elements. She was to continue this work in isolation until her death on July 4, 1934.

Other women, either directly or indirectly, contributed to the world of scientific discovery. Lise Meitner, a German physicist, escaped from Hitler's Europe to Sweden in the early 1930's. By 1939, through intensive research, she announced the success of her experiments in nuclear fission - the breaking apart of atoms.

Another woman of science, Leona Woods, worked on a research team led by Enrico Fermi. Mr. Fermi emigrated from Italy to the U.S. On December 2, 1942, Miss Woods announced for the team an event that changed the world. This was the first controlled, self-sustained nuclear reaction. A few years later Americans would use this knowledge to devise the first atomic bomb.

Even young women are showing their ingenuity today. Recently, Betty Galloway, from Georgetown, South Carolina, patented an invention. She invented a bubble-blowing toy which works by immersing the device in water; thus forcing air against a soap film, forming the bubble. Betty was 10 years old.

The field of science and invention is wide open today for creative people. Each contribution makes life just a little bit more enjoyable and healthful for all of us.

INVENTORS AND INVENTIONS UNIT

"FAMOUS BLACK INVENTORS"

America owes a great deal to the contributions of its "minority inventors". Black Americans, in particular, have an inventive heritage.

Norbert Rillieux, for instance, was a black American born in New Orleans in the year 1806. He became a free man of color in later years and even was sent to Paris, France for his education. There he learned steam engineering, which he applied brilliantly in designing his multiple-effect evaporator.

He received a patent in 1843 on this invention which transformed sugar cane-juice processing, sharply reduced costs, and produced purer sugar with greatly increased efficiency.

Norbert accomplished this even though he suffered through social and legal indignities. He was still regarded as inferior due to his skin color. Mr. Rillieux died in 1894.

George Washington Carver was a one-time slave who transformed the South's agricultural system. Mr. Carver spent 47 years of his life in Tuskegee, Alabama. During this time he spent most of his waking hours in the laboratory testing all kinds of products. Besides achievements in other areas, George Washington Carver developed more than 300 products from peanuts alone.

Jan Ernst Matzeliger also was a great achiever. Mr. Matzeliger was a part-Negro immigrant from Dutch Guinea. While working as an apprentice he saw how painstakingly slow it was for one man to construct a pair of shoes. He worked and invented a machine which would produce up to 400 pairs of shoes a day. This labor-saving invention produced eight to ten times the output of one skilled laborer.

All three men, Norbert Rillieux, George Washington Carver, and Jan Ernst Matzeliger; proved than any man can be creative and inventive regardless of the color of your skin.

NAME_____

CLASS_____

INVENTORS AND INVENTIONS UNIT

Quiz: Over readings, "Famous Women Inventors" and "Famous Black Inventors."

Directions: Using the word list at the bottom, fill in the missing words.

1. _____ _____ assisted in inventing the process for the control of self-sustained nuclear reaction.

2. _____ _____ invented the multiple-effect evaporator which aided sugar refining.

3. _____ _____invented a machine to make shoes at the rate of 400 pairs a day.

4. _____ _____ invented a method of breaking atoms apart - a vital part of nuclear fission.

5. _____ _____ tested all kinds of products, one area was in the peanut industry.

6. _____ _____received two Nobel Prizes for work and inventions in radioactivity and chemistry.

LIST OF NAMES

Marie Curie	Lise Meither
Norbert Rillieux	Leona Woods
George Carver	Jan Matzeliger

INVENTORS AND INVENTIONS UNIT

"FAMOUS AMERICAN INVENTORS WHO WERE IMMIGRANTS": Using resource materials in the Learning Center match the immigrant inventor with their invention. America's strength has always been enhanced by these "new Americans." Only in a free country like the United States can people freely create. . . and be rewarded for their creation.

IMMIGRANT/INVENTOR	PLACE OF BIRTH	NAME OF INVENTION
1. Vladimir Zworykin	_____	_____
2. Enrico Fermi	_____	_____
3. Nikola Telsa	_____	_____
4. Alexander Graham Bell	_____	_____
5. Reginald Fessenden	_____	_____
6. Humphrey O'Sullivan	_____	_____
7. Conrad Hubert	_____	_____
8. Levi Strauss	_____	_____
9. Peter Goldmark	_____	_____
10. Otto Mergenthaler	_____	_____

LITTLE-KNOWN INVENTORS WITH UNUSUAL INVENTIONS - Match the inventor with the invention. Although not perhaps as "earth-shattering" in their importance to the world, these people deserve recognition for their contributions for a better life.

INVENTOR	INVENTION
1. Josephine Dickson (U.S.)	bikini bathing suits
2. Clarence Crane (U.S.)	ice cream
3. H. L. Lipman (U.S.)	chewing gum
4. John G. Carter (U.S.)	jello
5. Edwin Budding (G.B.)	miniature golf
6. Jacques Heim (Fr.)	band-aids
7. John Spilsbury (G.B.)	jigsaw puzzles
8. Charles Menches (U.S.)	eraser
9. John B. Curtis (U.S.)	life savers candy
10. P. B. Wait (U.S.)	lawn mower

BONUS QUESTION: What American woman invented the vacuum milking machine?

_____

NAME_____

CLASS_____

Answer Sheet: Famous Immigrant Inventors

1.	Russia	Television (Iconoscope)
2.	Italy	Nuclear Reaction (atomic energy)
3.	Austria-Hungary	Electric Power System
4.	Scotland	Telephone
5.	Germany	1st radio-telephonic broadcast
6.	Ireland	Rubber Heels
7.	Russia	Flashlight
8.	Jewish	Blue Jeans
9.	Austria	L.P. Records
10.	Germany	Linotype

Answer Sheet: Little Known Inventors

1. 6
2. 8
3. 9
4. 10
5. 4
6. 1
7. 7
8. 3
9. 2
10. 5

BONUS: Anna Baldwin

Perception: what you see may not be there.

1.

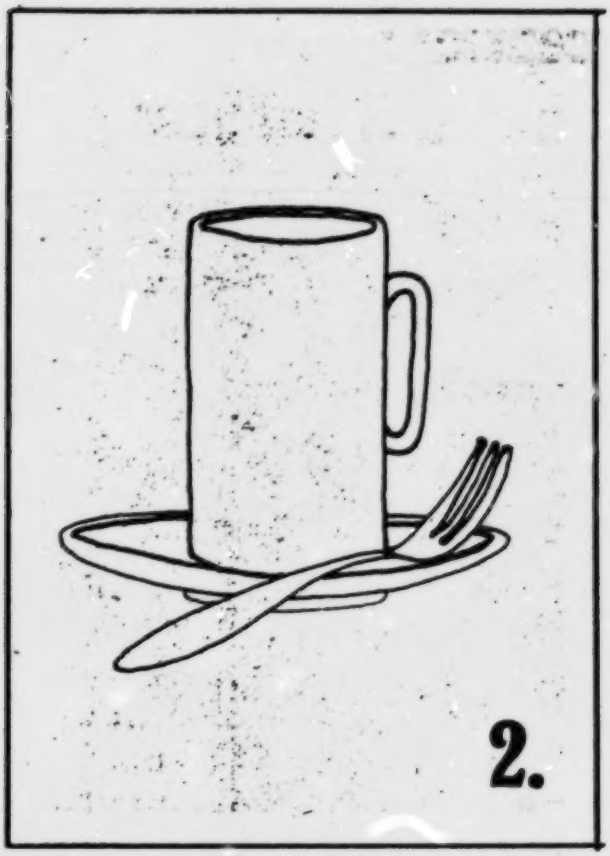
Look at Picture No. 1. It is a cup of coffee. Describe what else you see in the picture. Then turn the page, and look at Picture No. 2.

Most people would say that in the first picture there is a spoon in the coffee cup. Did you describe it that way? If you did, ask yourself these questions:

1. Was there a spoon in the picture?
2. Did I see a spoon in the picture?

The answer to the first question is no. But that doesn't mean that you didn't "see" a spoon. You probably did.

How can you see something that is not there? Scientists who study *perception* have some answers.



YOUR MIND AND YOUR SENSES

Perception is being aware of things through your senses. For example, you perceive (see) a traffic light with your eyes. You perceive (hear) a siren with your ears. You perceive other things with your senses of touch, taste, and smell.

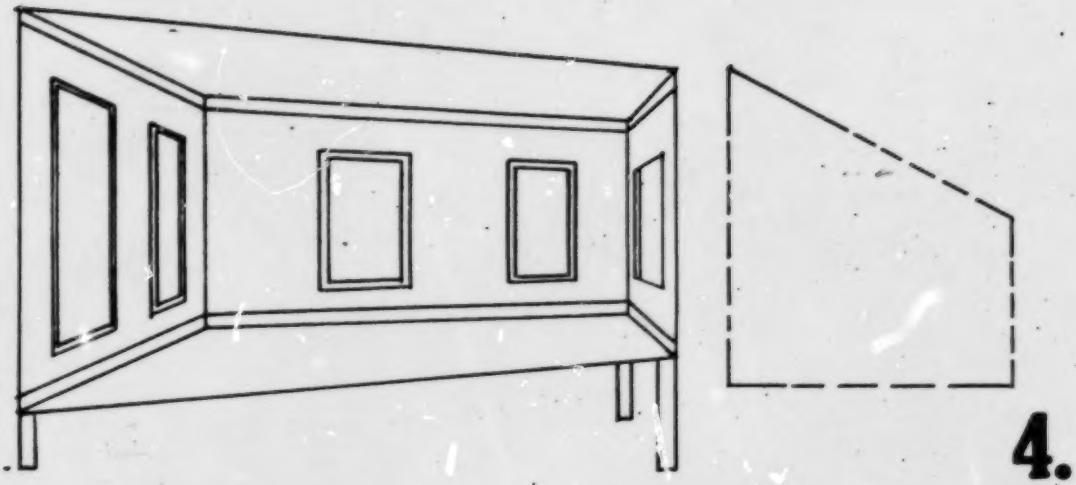
But you use more than these senses to perceive things. You also use your mind. Your mind explains the information it gets from your senses.

Think about Picture No. 1. When you first looked at it, you saw the handle of something in the cup of coffee. You know that coffee is usually stirred with a spoon. So your mind probably jumped to a conclusion. You probably thought that the handle must belong to a spoon.

When you looked at Picture No. 2, you learned that this conclusion was wrong. But you really did "see" a spoon in the first picture.

Does this mean that you can't trust your senses? No. Your eyes did not fool you in this case. Your mind made the mistake.

Your mind can make mistakes with information it gets from your other senses. Here are some more examples:



4.

SENSE OF HEARING

President Nixon talked to members of the press on September 5, 1973. He talked about nine of the Watergate tape recordings.

He said, "The only time I listened to the tapes — to certain tapes — was on June 4." He added that he knew what was on most of the nine tapes.

The next day, some newspapers printed: "The only time I listened to the tapes — two certain tapes — was on June 4."

Some people wondered how the President knew what was on most of the tapes — if he had listened to only two of them. Read again what he *said*. Then read what some reporters *heard*.

SENSE OF SMELL

Many people like the smell of pine. It makes them think of Christmas. Some people buy fake Christmas trees. But these trees do not have a pine smell.

People with fake trees can buy pine spray. They can spray it on their trees. They know their trees aren't real. But the spray helps them to fool themselves. They get the "feeling" of having real trees from the smell of pine.

SENSE OF TASTE

Here is something you might try. Put a tablespoon of sugar in a small glass of water. Take a large sip of the water. Hold it in your mouth for 20 seconds. Then empty your mouth into a sink.

Now taste some fresh water. You'll probably think that there is salt in the fresh water.

SEEING WHAT YOU EXPECT

Sometimes you perceive things because you expect to perceive them. Here are some examples of how you can be fooled by expecting something to be true.

Look at Picture No. 3. You see an elephant and a mouse in a room. But the mouse looks much larger than the elephant. This is because you expect the room to be a certain shape.

Most rooms are squares or rectangles. So you expect this room to be a rectangle. You expect it so much that you actually "see" a rectangle.

The elephant and the mouse each stand in a far corner. You expect them to be the same distance from you. But the elephant is really much farther away from you than the mouse is. Picture No. 4 shows the real shape of the room they are in and a cross section.

Now look at Picture No. 5. What does it say in the triangle?

5.

Most people would say "All in the Family." You have probably heard the phrase before. And a quick look makes you expect the words to say that.

Look at the triangle again. Whisper every word very slowly. What is really written there?

Here is another example of how you can see what you expect to see. Answer this question about Picture No. 6:

Do you think these are the faces of two boys or two girls?

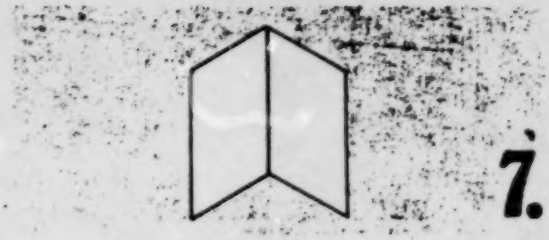
Look at the picture again. Now answer this question:

Does the white vase look large enough to hold a dozen roses?

The first question makes you expect to see two faces in the picture. The second question makes you expect to see a vase. Did you see what you expected each time?

The picture can look like either two faces or a vase. It depends on whether you look at the light part or the dark part of the picture. Even without the questions, you might have seen two designs in the picture. You just have to stare at it long enough.

6.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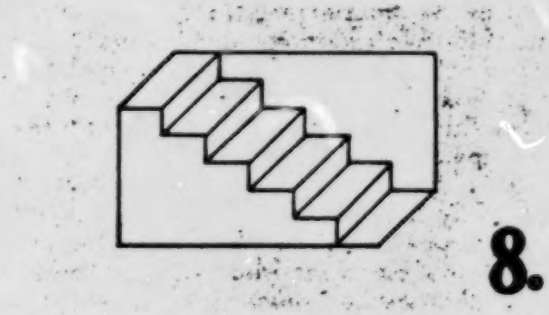
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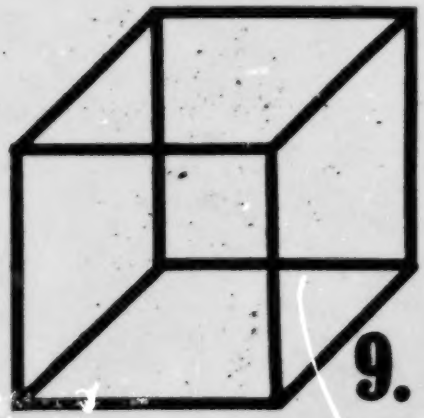
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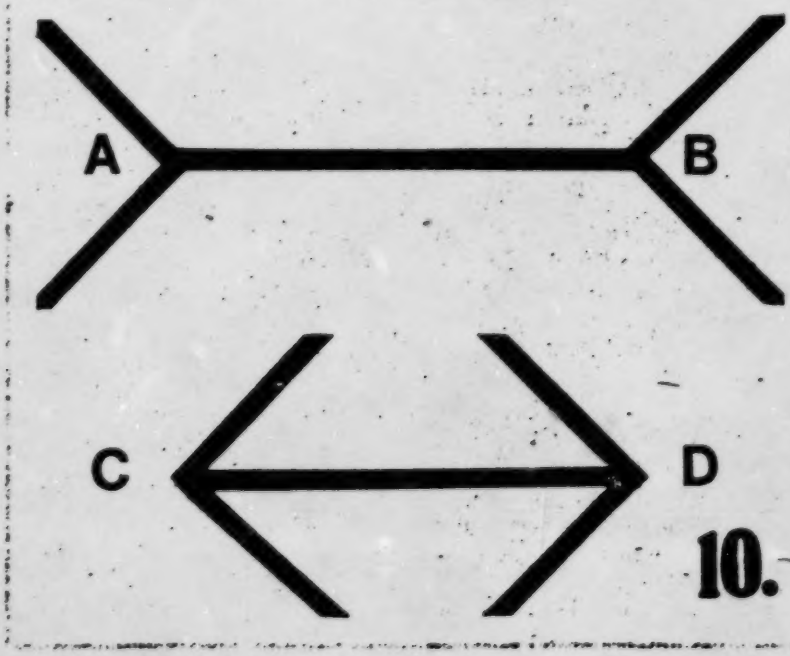

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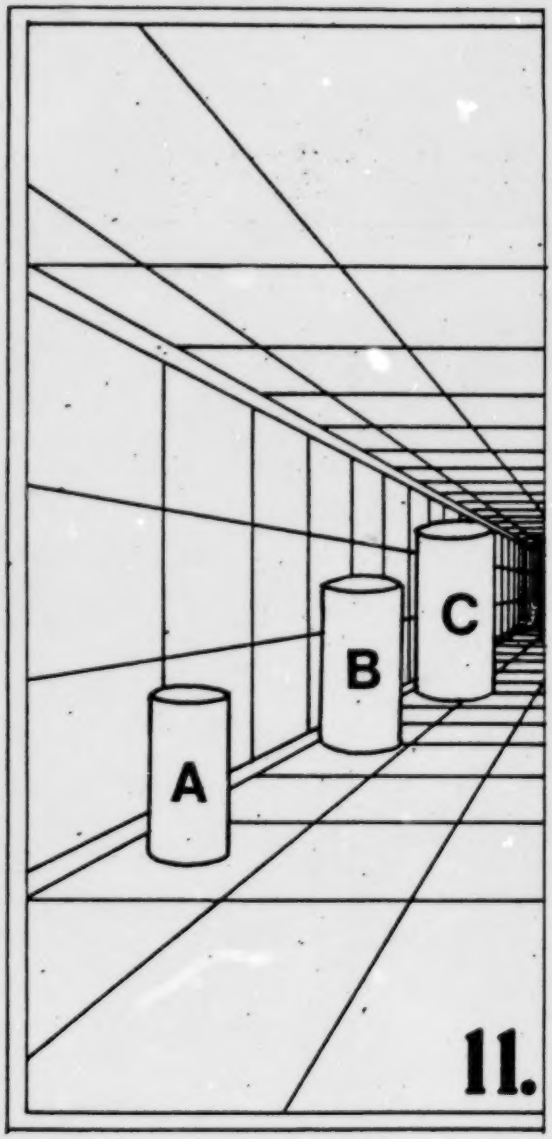


ONE PICTURE, TWO VIEWS

Here are some other examples of how your eyes can see two different things in the same picture. You may have to look at each one for a while before you see it both ways.

Look at Picture No. 7. Does it show the inside of a booklet — or the outside cover? First, you will see one or the other. Stare at it some more. Can you see both?

Look at Picture No. 8. Are you looking down at this flight of stairs? Or are you seeing it as though you were under the stairs and looking up?

Now, look at Picture No. 9. Which side of the cube is nearest you? Does everyone in your class agree?

CONTEXT

You've seen several ways that your mind and eyes can be fooled. Here is another way. It is caused by the *context* in which something appears. Context is what surrounds or touches something.

Look, for example, at Picture No. 10. Which line is longer? Line AB or Line CD? After you decide, measure both lines.

Now look at Picture No. 11. Which barrel is tallest? After you decide, measure each barrel.

Were you fooled in both cases? Most people are. They are fooled by the context in which the lines and barrels appear.

Look again at Picture No. 10. The short lines, at the ends of Line AB and Line CD are what fool the eye. Without the short lines, Line AB and Line CD would look the same length.

Now look at the lines surrounding the barrels in Picture No. 11. These lines make Barrel C look farthest away. If it is farther away than Barrel A, you figure, it must be taller than Barrel A. Without these lines, the three barrels would look the same size.

Even after you measure the barrels, you still may see a difference in size. It's as though your eyes cannot accept what your mind thinks is true. So we sometimes see things that we believe are impossible.

BELIEVING THE IMPOSSIBLE

This is what happens when we watch a magician perform. We know that things don't disappear. We know that things don't come from nowhere. But we "see" it happen in a magic show.

Why? Partly because we expect it to happen. And partly because the magician is very skillful. A magician's hands move so fast and smoothly that we can't follow what they are really doing.

In movies, we also "see" things we know are impossible. We know there are no actors or actresses in front of us. We know that people and things are not really as big as they look on a movie screen. But we "see" those people and things right there in front of us. If the movie is good, we believe that the action is happening then and there.

Let's get back to an important question. It was asked near the beginning of this article. Can you trust your own senses?

The answer is that you can — most of the time. But sometimes your mind and your five senses can be fooled. Remember this the next time you feel like saying, "I know it's true. I saw it with my own eyes."

INVENTORS AND INVENTIONS UNIT

Teacher Discussion Questions - - PERCEPTION Reading:

Page 5: "How many of you said there was a spoon in the cup of coffee? You perceived that it was there (a mental picture registered in your brain sent by your senses)."

"What are the 5 senses?" . . . Sight, Smell, Touch, Hearing, Taste

Page 6: "Discuss the elephant story and what sense(s) were "fooled".

Page 7: Discuss picture #4 (real shape of the room); also, #5.

Page 8: Picture #6:. . "Do you see 2 faces or a vase?"

Picture #7:. . "Do you see the inside of a booklet or the outside cover?"

Picture #8 . . "Are you looking up or down a flight of stairs?"

Picture #9 . . "Which side of the cube is nearest you? Do you all agree?"

Picture #10. . "Which line is longer?" (same length)

Picture #11 . ."Which is the tallest?" (all three the same)

NATIVE AMERICAN INVENTORS

SEQUOYA

The Native American has contributed much to the welfare of all Americans, especially in the area of communications. The Navajo, for instance, played a major role in this area during World War II. They invented a unique language of communicating information via walkie-talkie. This confused the enemy who had been easily intercepting Key American information on the front lines in battle-torn areas of the South Pacific.

Sequoya was a Cherokee Indian who invented a system of writing. He was born in the Indian town of Taskigi, Tennessee, in 1770. His father was white and his mother was Cherokee. He grew up among the Indians, however, and knew no English.

But, as an adult, Sequoya became fascinated with the white man's method of communicating by writing. He set himself the task of inventing a system of writing for his own people, and completed it in 1821 after 12 years of work. With this writing system the Cherokee were able to publish newspapers and books in their own language . . . and many of them learned to read.

Later, Sequoya became interested in representing his people in government legislation. He spent years in Washington, D.C., as their representative.

Sequoya died in 1843. The state of Oklahoma has a statue dedicated to him in the nation's capitol; displayed in Statuary Hall.

Countless other Native Americans have contributed their inventive skills and remain a very proud people today. All Americans owe a great debt to their achievements.

YOU TRY TO FIGURE IT OUT

A = Wol-la-chee = ant
A = Be-la-sana = apple
A = Tse-nihl = axe
B = Shush = bear
C = Moasi = cat
D = Be = deer
D = Lha-cha-eh = dog
E = Dzeh = elk
E = Ah-nah = eye
E = Ah-jah = ear
F = Ma-e = fox
G = Kizzle = goat
H = Lin = horse
H = Tse-gah = haie
I = Tkin = ice
I = Yeh-hes = itch
J = Tkele-cho-gi = jackass
K = Kizzle-yassie = kid
L = Dibeh-yassie = lamb
L = Ah-jad = leg
M = Na-as-tso-si = mouse
N = Ts-a = needle
N = A-chen = nose
O = Ne-ahs-jah = owl
O = Tlo-chin = onion
O = A-kha = oil
P = Bi-so-dih = pig
Q = Ca-yeilth = quiver
R = Gah = rabbit
R = Dah-nas-tsa = ram
S = Klesh = snake
S = Dibeh = sheep
T = Than-zie = turkey
T = D-ah = tea
T = A-woh = tooth
U = No-da-ih = Ute
U = Shi-da = uncle
V = A-keh-di-glini = victor
W = Gloe-ih = weasel
X = Al-an-as-dzoh = cross
Y = Tash-as-zih = yucca
Z - Besh-do-gliz = zinc

WORKSHEET, The Navajo's Secret Weapon

Using the Indian code that was so effectively used during World War II, see if you can figure out this wartime command:

Dzeh Wol-la-chee Kizzle Ah-jad Ah-jah A-kha Ts-a Ah-nah

D-ah Lin Tkin Klesh Yeh-hes Dibeh Dzeh Wol-la-chee

Kizzle Ah-jad Ahjah Than-zie Gloe-ih Ne-ahs-jah.

A-wah Tse-gah Azeh Shush Ah-nah Tse-nihl Moasi Lin

Tkin Dibeh Kleh Ah-nah Moasi Shi-da Gah Ah-jah Moasi

Dzeh Be-la-sana Dibeh Ah-nah Ma-e Tkin Dah-nas-tsa Tkin

A-chen Kizzle.

Answer: EAGLE ONE THIS IS EAGLE TWO. THE BEACH IS SECURE.
CEASE FIRE.

NAME_____

CLASS_____

INVENTORS AND INVENTIONS UNIT

"What Do You See?"

Let's see just how observant you are. All around us are everyday objects and occurences. But how many of us truly look at the details of what we see?

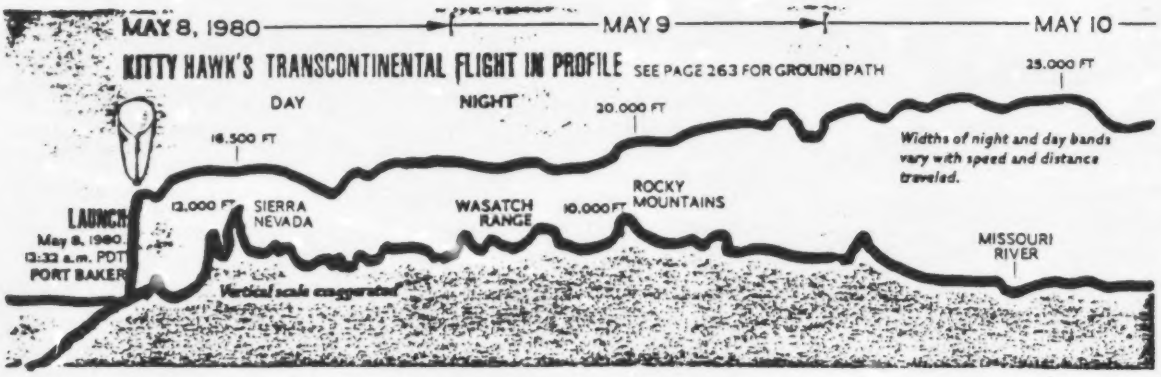
Answer the following questions, and find out how observant you are.

1. On a penny, does Abraham Lincoln wear a tie?_____
2. With a quarter "heads up", does George Washington face to the right or left?_____
3. Other than the words "America", what seven letter word appears on all U.S. coins?

   _____
4. On the American flag, which stripes are in the majority - red or white?_____
5. On which side of the uniform does a policeman wear his badge?_____
6. How many letters of the alphabet (capital) have a curve in them?_____
7. In which hand does the Statue of Liberty hold a torch?_____
8. Which alphabet letter is missing on a phone dial?_____
9. Is the coin return slot on the left or right side of a public phone?_____
10. On which side of a postage stamp does the price usually appear?_____

ANSWERS:

1. Yes (a bow tie)
2. Left
3. Liberty
4. Red (seven reds, six white)
5. Left
6. Eleven
7. Right
8. Q
9. Left
10. Right



"Kitty Hawk" Floats Across North America

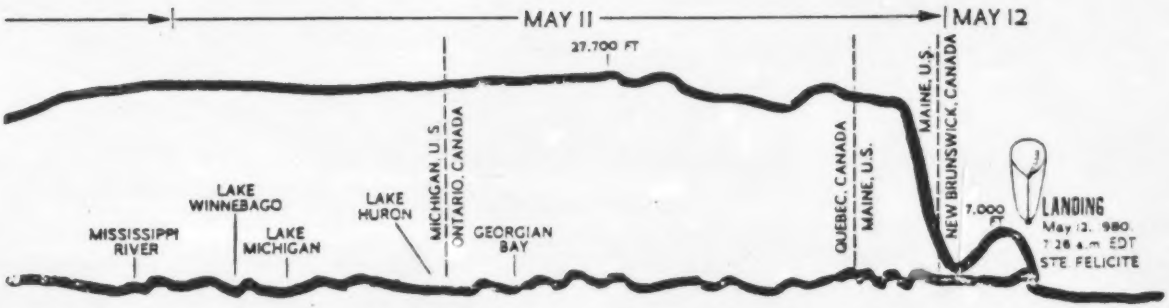
ADRIFT in a tranquil sky, our helium balloon *Kitty Hawk* soars northeastward at 18,000 feet above Wyoming on the second morning of our transcontinental flight.

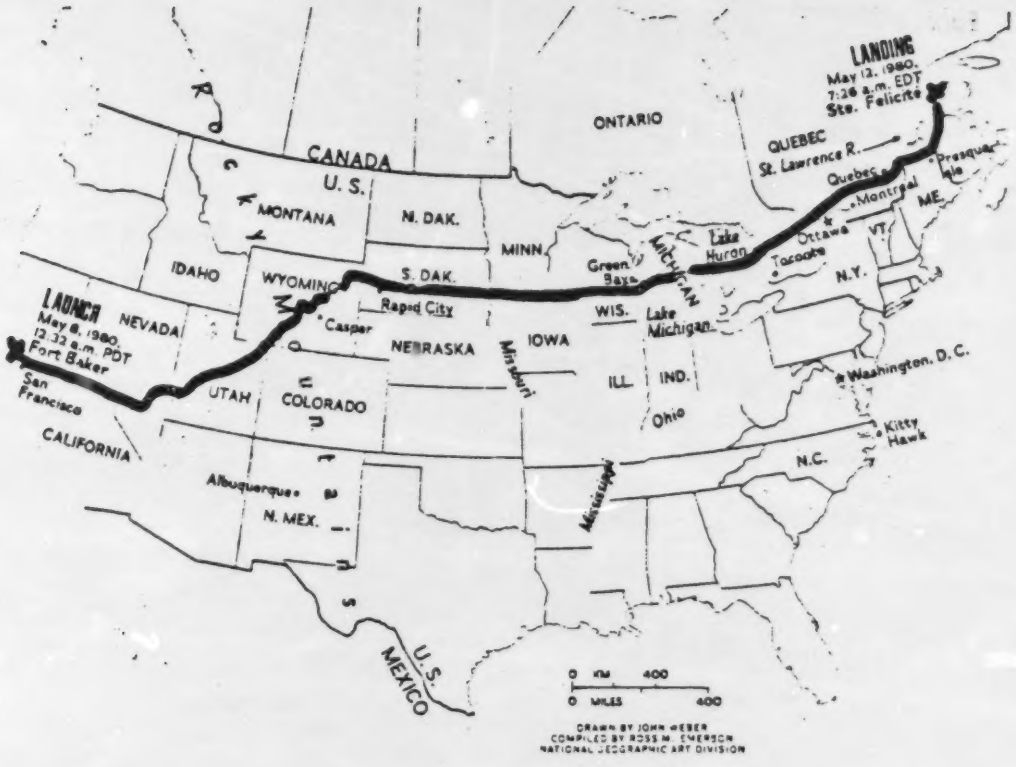
Despite the chill altitude and thin air—requiring oxygen masks—the temperature hovers at 45°F, allowing us to prop open the doors of our enclosed and heated gondola.

A father-and-son team with nine years' ballooning experience—mine including the first successful transatlantic flight*—we are backed by a dedicated crew whose names appear on both sides of the gondola.

As I photograph this scene with a camera attached to the boom in foreground, Kris stands secured by a safety belt atop one of our liquid ballast tanks bearing the name of our helium supplier. The graduated Plexiglas tank at left enables us to jettison liquid ballast in measured amounts.

Such moments of peace are destined to end shortly. Within hours we will find ourselves encircled by violent thunderstorms that threaten to slam *Kitty Hawk* into the ground or loft us to our death at 50,000 feet. Fortunately the storms will subside, and *Kitty Hawk* will continue cross-country.





TRAJECTORY of triumph carries Kitty Hawk 3,400 miles in distance flown, from launch site at San Francisco Bay to Ste. Félicité on Canada's Gaspé Peninsula.

Kitty Hawk's historic flight, the first nonstop crossing of North America by balloon, covered a great-circle distance of 2,823 miles in 99 hours, 54 minutes. The National Aeronautic Association credits the Andersons with the first successful transcontinental flight, since they launched in view of the Pacific and sighted the Atlantic before touchdown.

The Andersons chose to fly at extreme height, averaging 24,000 feet. Moving slowly northeastward during the first two days aloft, Kitty Hawk picked up speed over South Dakota and reached a dizzying 85 miles an hour above Lake Michigan. Touchdown occurred a thousand miles north of the projected landing site: Kitty Hawk, North Carolina, where the Wright brothers first flew in 1903.

*Tethered bubble of helium, a 200,000-cubic-foot polyethylene envelope (**following pages**) floats in the bright glare of floodlights high above the launchpad at Fort Baker, California, just north of the Golden Gate Bridge. One of the largest manned balloons ever built, Kitty Hawk weighed four and a half tons at lift-off, approximately half of it sand and liquid ballast. The latter consisted of 40 percent water and 60 percent antifreeze to combat sub-zero temperatures aloft.*

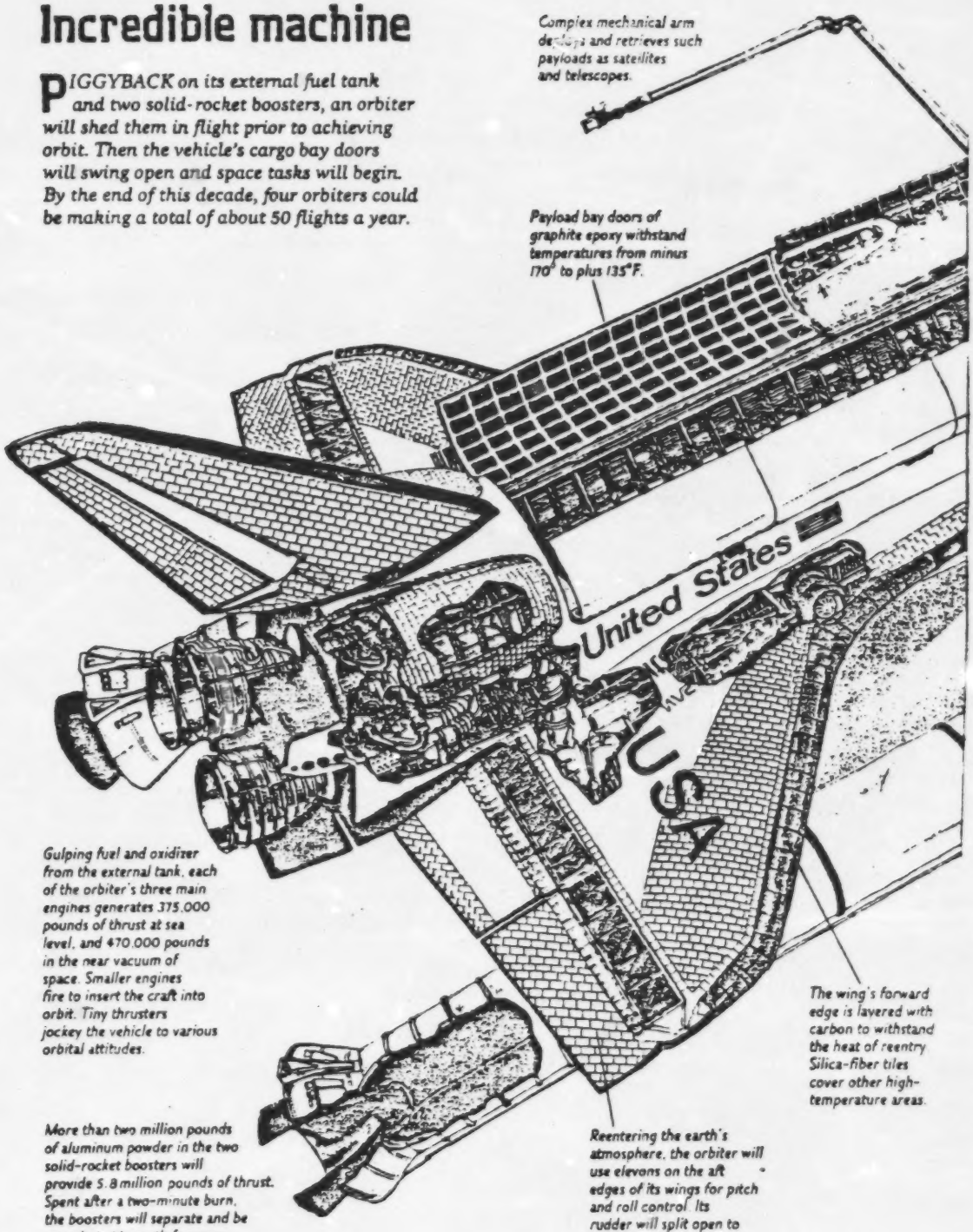
Here twin inflation tubes fill the balloon from either side. The tubes were then sealed and attached to the gondola to prevent loss of helium during the flight. An hour later, at 12:32 a.m. on May 8, 1980, Kitty Hawk and its two-man crew rose smoothly into the California sky and caught the first winds sweeping eastward across the continent. Within hours the balloon was joined by an escort plane that accompanied it across the country, except for refueling stops.

As a wind-powered machine, Kitty Hawk enjoyed the right-of-way over all aircraft in its flight path, but the Andersons sighted half a dozen commercial jetliners that diverted from normal air lanes to catch a glimpse of Kitty Hawk.

MICKEY PFLEGER

Incredible machine

PIGGYBACK on its external fuel tank and two solid-rocket boosters, an orbiter will shed them in flight prior to achieving orbit. Then the vehicle's cargo bay doors will swing open and space tasks will begin. By the end of this decade, four orbiters could be making a total of about 50 flights a year.



Complex mechanical arm deploys and retrieves such payloads as satellites and telescopes.

Payload bay doors of graphite epoxy withstand temperatures from minus 170° to plus 135°F.

Gulping fuel and oxidizer from the external tank, each of the orbiter's three main engines generates 375,000 pounds of thrust at sea level, and 470,000 pounds in the near vacuum of space. Smaller engines fire to insert the craft into orbit. Tiny thrusters jockey the vehicle to various orbital attitudes.

More than two million pounds of aluminum powder in the two solid-rocket boosters will provide 5.8 million pounds of thrust. Spent after a two-minute burn, the boosters will separate and be parachuted to earth for reuse.

Reentering the earth's atmosphere, the orbiter will use elevons on the aft edges of its wings for pitch and roll control. Its rudder will split open to function as a speed brake.

The wing's forward edge is layered with carbon to withstand the heat of reentry. Silica-fiber tiles cover other high-temperature areas.

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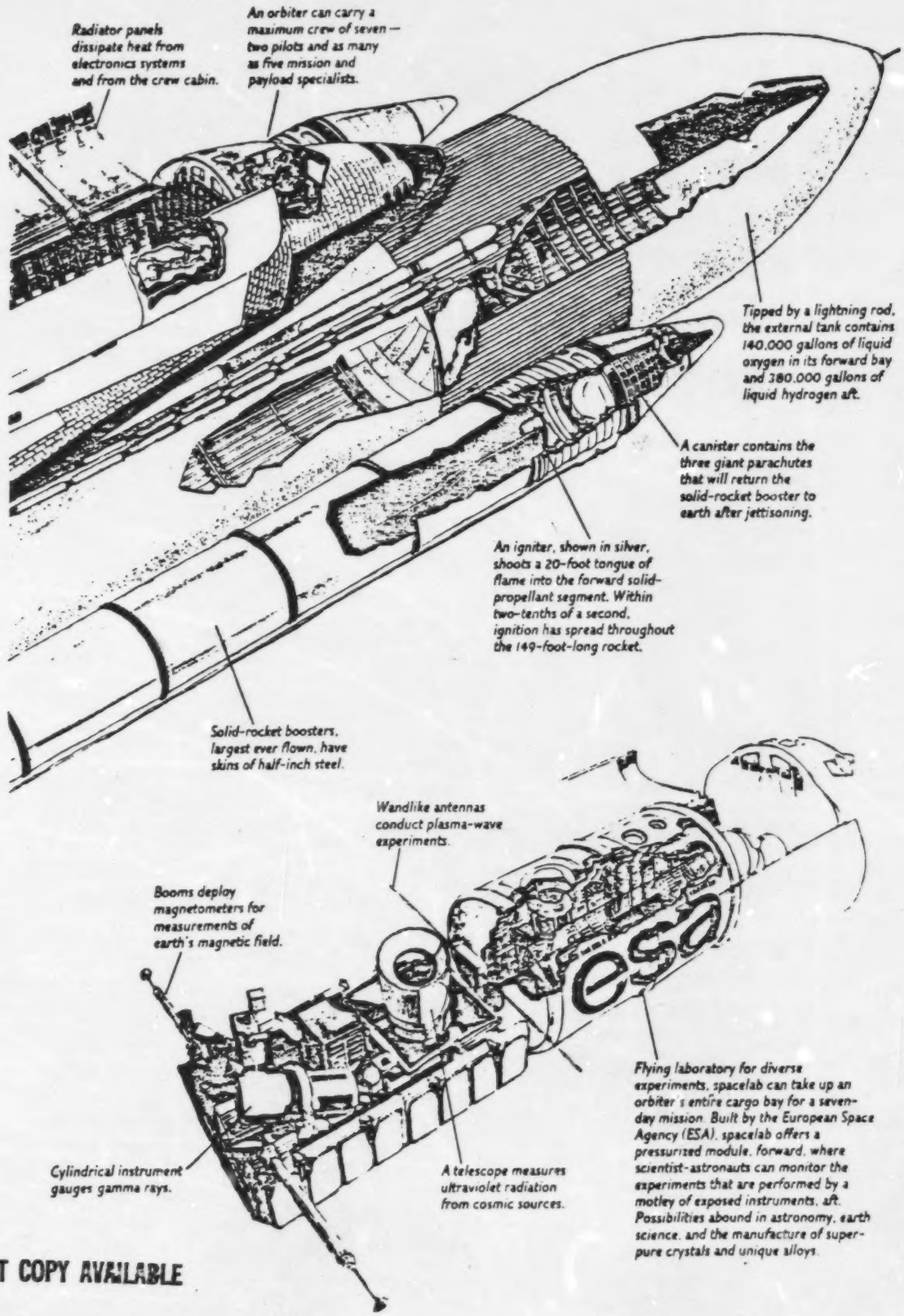
Radiator panels dissipate heat from electronics systems and from the crew cabin.
An orbiter can carry a maximum crew of seven — two pilots and as many as five mission and payload specialists.
Tipped by a lightning rod, the external tank contains 140,000 gallons of liquid oxygen in its forward bay and 380,000 gallons of liquid hydrogen aft.
A canister contains the three giant parachutes that will return the solid-rocket booster to earth after jettisoning.
An igniter, shown in silver, shoots a 20-foot tongue of flame into the forward solid-propellant segment. Within two-tenths of a second, ignition has spread throughout the 149-foot-long rocket.
Solid-rocket boosters, largest ever flown, have skins of half-inch steel.
Wandlike antennas conduct plasma-wave experiments.
Booms deploy magnetometers for measurements of earth's magnetic field.
esa
Cylindrical instrument gauges gamma rays.
A telescope measures ultraviolet radiation from cosmic sources.
Flying laboratory for diverse experiments, spacelab can take up an orbiter's entire cargo bay for a seven-day mission. Built by the European Space Agency (ESA), spacelab offers a pressurized module, forward, where scientist-astronauts can monitor the experiments that are performed by a motley of exposed instruments, aft. Possibilities abound in astronomy, earth science, and the manufacture of super-pure crystals and unique alloys.

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NAME_____

CLASS_____

INVENTORS AND INVENTIONS

Readings/Charts: "Kittyhawk" and Space Shuttle"

Kittyhawk Questions

1. What is "Kittyhawk"?_____

   A. What was it to the Wright Brothers?_____

2. When did their voyage begin?_____

   A. When did they land?_____

3. What does "transcontinental flight" mean?_____

4. Where was the "across boundary" site at? State of_____

   and province of_____.

5. As they sailed along did their altitude usually raise or lower?_____

6. What is a "gondola"?_____

7. One man on the flight had already accomplished what balloon achievement?_____

   _____

8. A great danger to anyone ballooning is the threat of what?_____

9. In what direction did their flight take them? From_____

   to_____.

10. Altogether the flight covered_____miles.

11. What is the N.A.A.?_____ _____ _____.

12. By the time they reached South Dakota they were going_____m.p.h.

13. Kitty Hawk weighed_____ tons at lift-off.

14. Why was their a need for anti-freeze in the liquid ballast?_____

    _____

15. Kitty Hawk enjoyed what privilege over jetliners as it traveled?_____

    _____

Incredible Machine(Questions)

16. What do they call these piggyback space vehicles?_____

17. By the end of the decade, these vehicles could be making a total of_____ flights a year.

18. Why is there a need for the mechanical arm?_____

_____

19. These giant vehicles contain_____main engines to give it the thrust needed.

20. The 2-million pounds of aluminum powder provide the thrust needed to get us out of the atmosphere. It takes just_____minutes to burn it all.

21. What covers the wings to protect them from the heat of re-entry?_____ and_____.

22. How many can go on these trips at this time?_____

23. What is contained in the canister strapped alongside?_____

24. What is the pressurized module called that is used by scientists to conduct experiments?_____

25. What is the telescope used for?_____

NAME _____

CLASS _____

Answers: Kittyhawk and Space Shuttle

1. A helium balloon

   A. 1st Powered Air Flight

2. May 8, 1980

   A. May 12, 1980

3. Across the continent

4. Michigan Ontario

5. Raised

6. Place where people are contained

7. Crossed the Atlantic

8. storms

9. west east (northeast)

10. 2,823 (or, 3,400)

11. National Aeronautic Association

12. 85

13. 4½ Tons

14. combat sub-zero temps

15. had right-of-way over all aircraft in its path

16. orbiters

17. 50

18. deploys and retrieves payloads

19. 3

20. 2 minutes

21. carbon silica-fiber tiles

22. 7

23. 3 giant parachutes

24. spacelab

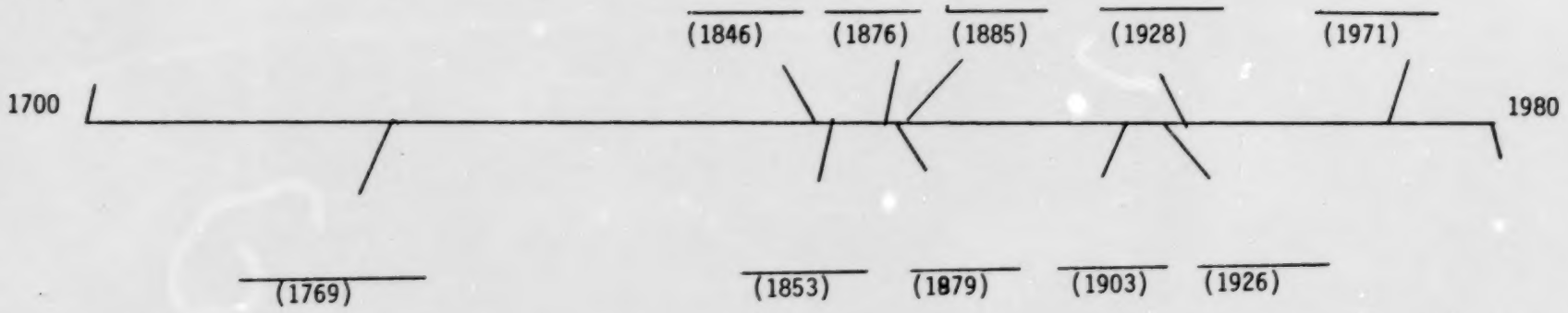
25. measures ultraviolet radiation

NAME _____

CLASS _____

INVENTORS AND INVENTIONS UNIT

Timeline Activity: Using reference material in the Learning Center, complete the timeline of important inventions. Use the word list below the line to fill in the missing data.



WORD LIST

A. Gasoline Auto	D. Telephone	G. Liquid Fuel Rocket	J. Electric Light
B. Lunar Rover	E. Powered Airplane	H. Elevator	
C. Steam Engine	F. Sewing Machine	I. Television	

ANSWERS:

1769 - Steam engine
1846 - sewing machine
1853 - elevator
1876 - telephone
1879 - electric light
1885 - gasoline auto
1903 - powered airplane
1926 - liquid fuel rocket
1928 - television
1971 - lunar rover

THOMAS ALVA EDISON

1847-1931 The Wizard of Menlo Park

Thomas Edison, one of America's greatest inventors, was born on February 11, 1847, in Milan, Ohio. When he first attended school in Port Huron, Michigan, his teachers complained that he was "too slow" and hard to handle. As a result, Edison's mother decided to take her son out of school and teach him at home. Although young Edison disliked arithmetic intensely, he was fascinated by science and at 10 had already set up his first chemistry laboratory.

Young Edison's early career took a strange twist when, at the age of 15, he saved a stationmaster's child from being crushed by a runaway freight car and was rewarded for his courage with an apprenticeship as a telegraph operator. Soon he was spending all his spare time inventing telegraphic devices. His first commercially successful invention was an improved stock market ticker to report market prices. Using the money he received for this venture, Edison opened his own shop in Newark, New Jersey, in 1870, where he made stock tickers and turned out several inventions, including paraffin paper, the electric pen, which became the mimeograph machine and a carbon transmitter that improved on Alexander Graham Bell's original telephone.

In 1876, Edison started what he called his "invention factory" in Menlo Park, N.J. Soon a flood of inventions and improvements began flowing out of Edison's laboratory, and he became known as the "Wizard of Menlo Park." There he made some of his greatest inventions, the phonograph, and improvements upon the incandescent lamp so that it could be produced in large quantities at low cost.

Edison's next masterstroke was to build the first central electric power station in the world, located on Pearl Street in lower Manhattan, New York City. His men spent two years (1880-1882) digging trenches and installing 14 miles of underground cable required to power the 400 lamps belonging to his first 85 customers.

His only basic discovery in the world of pure science, the "Edison effect", in 1883 was to become the basis for the vacuum tube, which proved so essential to modern radio technology. In later years, Edison contributed greatly to standardizing and improving motion picture technology.

Edison's inexhaustible energy and genius (which he allegedly defined as "one percent inspiration and ninety-nine percent perspiration") produced in his lifetime more than 1,300 inventions. He died, at 84, on Oct. 18, 1931, in West Orange, N.J.

NAME_____

CLASS_____

Reading Quiz: "Thomas Alva Edison - The Wizard of Menlo Park"

Questions: Short answer completions (use the word list, however, you won't use them all).

1. Thomas Edison was labeled as a "_____learner" when he attended school.
2. At age 15, young Edison was given a job as a _____operator.
3. In 1876, Edison started his "invention factory" in _____,
   _____, N. J. . . .
4. Because of his flood of inventions, Edison became known as a"_____."
5. These were two of Edison's greatest inventions: the_____
   and the_____.
6. The vacuum tube he worked with proved essential to modern _____ technology.
7. Thomas Edison said his energy and genius was "1%_____and
   99%_____."
8. In his lifetime, Edison produced more than_____inventions.

WORD LIST

Inspiration	Telegraph	New York City	Wizard	1300
slow	2,100	Genius	Incandescent Lamp	
Telephone	Fast	Phonograph	Perspiration	
800	Menlo Park	Radio	Television	

ANSWERS:

1. Slow
2. telegraph
3. Menlo Park
4. wizard
5. phonograph . . incandescent lamp
6. radio
7. inspiration . . . perspiration
8. 1,300

NAME_____

CLASS_____

NAME THE INVENTION OR INVENTOR GAME

I. Name the inventor? Clue:

A. He lived in both the 18th and 19th century-
B. He was also a politician from Virginia-
C. He invented a dumbwaiter, an odometer, swivel chair and a clock that also told the day of the week-
D. His home is at Monticello -
E. He was an excellent writer -
F. He was an important figure in our Declaration of Independence -
G. He was a President -
H. He was our 3rd President-
I. His initials are T.J.

II. Name the inventor - Clue:

A. Their invention came at the turn of the century
B. Leonardo da Vinci drew plans for one in the 15th century
C. The device was invented in 1903
D. The name, Kitty Hawk is important.
E. The inventor was a pair
F. The invention was like a bird
G. Their names were Wilbur and Orville.

III. Name the invention - Clue:

A. It was invented before 1800.
B. It had to do with labor.
C. It benefited the South
D. The date was 1793.
E. It made the South "King"
F. His name was Eli Whitney
G. It separated seeds from fiber
H. It worked with cotton.

IV. Name the invention - clue:

A. The date was 1888
B. The inventor also invented the light bulb
C. The Birth of a Nation
D. The inventor was Edison
E. The cost to you is less than $3.00
F. Raider of the Lost Ark
G. It shows film

V. Name the invention - clue:

A. Invented in 1849
B. By Walter Hunt
C. It is still about the same in design
D. It holds us together
E. Don't let it stick you
F. It's used on clothing
G. Buttons are used mostly

VI. Name the invention - Clue:

A. Invented in 1835
B. Widely used today for good and bad
C. It was famous in the West
D. It made the little man equal
E. 22-38-45 are types
F. Samuel Colt

VII. Name the invention - clue:

A. W. L. Judson
B. We use it almost every day
C. The Amish use hook and eyes
D. Associated with clothing
E. Trousers, jeans, slacks - all benefit
F. It's often hidden

VIII. Name the invention - clue:

A. In 1923
B. By Vladimir Zworykin
C. Weren't popular until the 50's
D. Virtually in every home
E. Emmy (T.V. award)
F. We use it especially at night
G. Solid-state, now

IX. Name the invention - clue:

A. In 1876
B. Popular in every home
C. Electrical device
D. Can be abused
E. The inventor's name gives it away
F. Northwestern is ours

X. Name the invention - clue:

A. Line of communication
B. In 1868
C. By Sholes. Glidden, and Soule
D. First ones were big
E. Today, many are electric
F. Royal
G. Ribbon is the key

XI. Name the invention - clue:

A. In every home
B. In 1851
C. By J. T. King
D. Housewives find it necessary
E. Often in the basement
F. Tide helps

NAME_____

CLASS_____

ANSWER SHEET: NAME THE INVENTOR GAME

1. Thomas Jefferson
2. Wright Brothers
3. Cotton Gin
4. Movie Projector
5. Safety Pin
6. Colt Revolver
7. Zipper
8. Television
9. Telephone
10. Typewriter
11. Washing machine

INVENTION UNIT TEST NAME_____

CLASS_____

Multiple-Choice: Choose the best answer -

_____ 1. Today, the highest priority is given to what kind of patents?

a. environment or energy related
b. transportation (mass transit)
c. towards chemical/medical research
d. recreational activity

_____ 2. How long may your invention be investigated before receiving a patent?

a. 1-5 years b. 2-7 years c. 2-10 years d. 5-12 years

_____ 3. How many patents have been issued in America, as of 1976?

a. over 1,500,000
b. over 2,500,000
c. over 4,000,000
d. over 5,000,000

_____ 4. A patent will not be granted for many reasons. Which reason does not belong?

a. item is already patented
b. item is not an invention
c. item is not useful
d. item is a new idea

_____ 5. For how long is patent protection granted?

a. 11 years b. 17 years c. 7 years d. 23 years

_____ 6. What public document protects an inventor and his invention?

a. Bill of Rights b. Constitution c. Declaration of Rights d. Magna Carta

_____ 7. What man almost beat Bell in inventing the telephone and getting a patent on it.

a. Tom Watson b. Terence Phone c. Thomas Edison d. Elisha Gray

_____ 8. Money that you recieve from a sale of a book or record is called what?

a. royalties b. dividends c. interest d. copyright

_____ 9. The first patent granted by the American colonies in 1641, was to whom?

a. Samuel Slater b. Samuel Holmes c. Samuel Hopkins d. Samuel Winslow

_____10. Who received the first U.S. Government patent?

a. Samuel Winslow b. Elisha Gray c. Samuel Hopkins d. Thomas Edison

_____ 11. If you get a "copyright" you are protected for how many years?

a. 5 b. 7 c. 9 d. 11

_____ 12. A brand name used on goods is called what?

a. trademark b. copyright c. logo d. patent

_____ 13. You must file for a patent within how many months of its first use?

a. 7 b. 12 c. 19 d. 27

_____ 14. What does "patent pending" mean?

a. That your invention is being investigated right now.
b. That your invention is approved for permanent rights to sell it.
c. That your invention has been applied for but not investigated yet.
d. That your invention will be patented when you apply for protection.

_____ 15. Approximately, what are your chances of getting rich on your invention?

a. 1 in 10 b. 1 in 50 c. 1 in 100 d. 1 in 250

_____ 16. What state and country is the most inventive?

a. Delaware . . . Germany
b. Mississippi - U.S.
c. Delaware - U.S.
d. Mississippi - England

_____ 17. One reason for concern is that who has received 1/3rd of all U.S. patents issued in the last 5 years?

a. Foreigners b. Corporations c. Wealthiest people d. 5 of our 50 states

_____ 18. If you had a chunk of rope . . . a tree with a hanging branch . . . bucket of water . . . and a candle . . . you could make a labor-saving device. Which would not apply?

a. candle snuffer b. bucket tipper c. hair washer d. vacuum cleaner

_____ 19. Concerning your senses . . . the other thing that makes you believe what you've perceived is what?

a. inner feeling (hunch)
b. mind (brain)
c. someone's advice
d. pain from not reacting

_____ 20. Which of these inventions would be the most recent?

a. Lunar rover (moon machine)
b. television (color)
c. telephone
d. automobile

Listing: Perception is being aware of things through your senses. List the 5 senses:(5 points)

a._____ b._____ c._____ d._____

e._____

Unscramble: Place these "How To Get Your Invention Off the Drawing Board" in the right order (#1 comes first, #2 is second, etc.): (6 points)

_____make finished product
_____Make rough copy
_____show it to stores
_____Sell it
_____Draw it
_____Try it (test it)

TRUE or FALSE: Use a T if it is true and a 0 if false.

_____ 32. You could patent an improved design for a steamboat.

_____ 33. You could patent an idea for a way to prevent shoplifting.

_____ 34. You could patent a plan for a potential machine which would make coal into low-qualify steel.

_____ 35. You could patent a device which would consist of the following: small wires. . . holder . . . spring loaded . . . and used to secure sheets of paper together.

NAME _____

CLASS _____

ANSWER SHEET: UNIT TEST

Multiple Choice

A 1.	B 6.	B 11.	C 16.
C 2.	D 7.	A 12.	A 17.
C 3.	A 8.	B 13.	A 18.
D 4.	D 9.	C 14.	B 19.
B 5.	C 10.	C 15.	A 20.

Listing

A. Hearing C. Touch E. Smell

B. Sight D. Taste

Unscramble

4	2
5	6
1	3

TRUE-FALSE

0 32.

0 33.

0 34.

0 35.

INVENTORS AND INVENTIONS UNIT

Bibliography of Material Used:

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2. Men of Science and Invention, American Heritage Publishing Co., Inc., Copyright 1980
3. Those Inventive Americans, National Geographic Society, Copyright 1971.
4. Weird and Wacky Inventions, by Jim Murphy, Crown Publisher, N.Y., Copyright 1978
5. All About Famous Inventions, by Fletcher Pratt, Random House, N.Y., Copyright 1955.
6. Why Didn't I Think of That?, by Webb Garrison, Prentice - Hall, Inc., Englewood Cliffs, N.J., Copyright 1977.

Film Listing: Area 7 Center

#9350 - To Be Creative (15'). . . story of people with handicaps who exhibit much creativity

#3310 - Sensory World (26') . . . explains the 5 senses and how they can be "fooled".

#2253 - Patent Pending (22'). . . excellent account of the patent process and its history

#9105 - Edison - Persistent Genius (15') . . America's greatest inventor

#3121 - Houdini Never Died (28') . . life of the remarkable illusionist and escape artist

#1367 - Inventions in America's Growth (15') . . highlights key inventions starting back in colonial days

#3910 - It Couldn't Be Done (53') . . shows the creativity and determination of monumental achievements like Mr. Rushmore, Panama Canal, and the Golden Gate

SUPPLEMENTARY

MATERIAL

NAME_____

CLASS_____

INVENTORS AND INVENTIONS UNIT

Enrichment Activity: "Making a Labor-Saving Device"

Directions: A labor-saving device uses only natural energy and draws it's energy from a "chain-reaction" sequence. From the list of parts you must construct a labor-saving device . . choose from the list of devices or think of an original invention. Follow the rules listed for your device.

Rules:
A. Use clear paper
B. Use lead pencil
C. Label all parts (Minimum of 8-10)
D. Under the device, explain each labeled part.
E. Give it a name.
F. Use compasses, rulers, etc., to make neat lines.

List of Parts: You do not have to use them all.

String (or, rope)
Seesaw
Rubber bands
Springs
Fire
Running water
Wind
Paddlewheel
Funnel
Pulleys
Balloons
Matches
Fuses
Sandpapers
Conveyer Belts
Gears
Ice
Magnifying glass
Bucket
Handsaw
Hammer
Knife

What To Choose:

A. Balloon Popper (no hands allowed)
B. Bubble Machine
C. Candle Snuffer
D. Dice Roller
E. Goldfish feeder
F. Page Turner
G. Potato Masher
H. Watermelon de-seeding machine
I. Silent Alarm Clock
J. Toothpaste Squirter
K. Or, think of an idea for something else not listed above.

MORSE CODE ACTIVITY: INVENTIONS UNIT

On May 24, 1844, Samuel F. B. Morse made the first telegraph message. By using his code try and figure out what the first message read.

. _ _ . . . . . _ _ (4 letters)

. . . . . _ _ . . . . (4 letters)

_ _ . _ _ _ _ . . (3 letters)

. _ _ . _ . _ _ _ . . _ _ _ . . . . . _ (7 letters)

MORSE CODE

A	. _	N	_ .
B	_ . . .	O	_ _ _
C	_ . _	P	. _ _
D	_ . .	Q	_ _ . _
E	.	R	. _ .
F	. . _ .	S	. . .
G	_ _ .	T	_
H	. . . .	U	. . _
I	. .	V	. . . _
J	. _ _ _	W	. _ _
K	_ . _	X	_ . _ _
L	. _ . .	Y	_ . _ _
M	_ _	Z	_ _ . .

The above message read: _____ _____ _____ _____.

Answer: WHAT HATH GOD WROUGHT?

INVENTORS REACH FOR SUN, EARTH

By Edward Nichols and Cliff Smith

If there are Americans who do not know that the United States has an energy problem, they have not been in sight or sound of the news media since October 1973, don't drive automobiles, heat homes or worry about inflation.

All other U.S. citizens are too painfully aware of the finite supplies of oil and gas since petroleum-producing nations called the energy crisis to their attention so abruptly four years ago.

Americans have responded to the crisis in typical fashion. Some simply ignore it. Others don't believe that there is a problem, preferring to think that the rising scarcity and price of fossil fuel is a plot by big oil producers and distributors.

A tenacious handful have turned to inventing.

Some inkling of their numbers may be gleaned from the workload of the Office of Energy-Related Inventions at the National Bureau of Standards. The special office was established by the 1974 federal Non-Nuclear Energy Research and Development Act.

Its purpose is to try to assure that no significant device that can produce or save energy is overlooked. It is tailored precisely for individual inventors who cannot get large companies interested in their devices, and who don't have the resources to produce and market their devices themselves.

Since the office became operational a little more than a year ago, some 7,500 persons have asked federal evaluators to look at an array of inventions and "reinventions." Some simply giving suggestions.

It has five full-time evaluators, with a $1.5 million annual budget, who screen requests and forward their recommendations to the Department of Energy.

So far the Department of Energy has selected a total of 53 inventions to support, usually by giving up to $90,000 in grants or for marketing studies.

There is no doubt that most Americans are fascinated by the original source of energy - the sun.

About half of all requests for evaluation received by the Bureau of Standards relate to solar energy, most of them asking support for devices that use the sun's heat to warm water, air or some other substance.

Jacob Rabinow, chief evaluator of new inventions, says that he hasn't seen a single new concept for using solar heat. Rabinow himself is the holder of 200 patents.

"There are solar collectors and there are solar intensifiers. There are also solar tricks, but so far it's all a rehash of old ideas," Rabinow said.

ON THE OTHER HAND: The geothermal energy bonanza may turn out to be as much of a pfft and a gurgle as a geyser shoosh of searing steam.

That is the conviction, at least, of 350 experts in the field.

Their aim is to harness low-grade geothermal resources that previously have been ignored in the great steam rush.

Until 1973 federal programs concentrated heavily on the hottest prospects - geysers and steam wells delivering water vapor at temperatures over 450 degrees, usually under high pressure.

The superhot resources were favored because of their ability to power turbines coupled to generators for the large-scale production of electricity.

TROUBLE-FREE resources such as this have proven to be rare. The outstanding example if The Geysers geothermal field in Sonoma and Lake counties, Calif. Wells in this field now are powering generators delivering more than 500 megawatts into the Pacific Gas and Electric Co. electric grid. This output will increase to more than 900 megawatts sometime next year.

Efforts to develop similar resources, however, have been plagued by lower than optimal temperatures and pressures, by excessive water flows, by noxious gases in the steam and by high concentrations of salts and other minerals that corrode and clog pipes.

Whereas federal interest previously focused on electric power generation, it now is broadening to include strong emphasis on non-electric, or "direct," uses for geothermal energy.

An Energy Department-sponsored study has established that Mammoth Lakes Village, a Northern California resort community with a winter ski population of 17,000, could be heated with natural steam at substantial savings over the electrical and liquid petroleum gas heating systems presently used.

Such systems are by no means new. It was described, for instance, how homes and business in Boise, Idaho, have been heated by underground steam since 1890.

NAME_____

SECTION_____

INVENTIONS UNIT

ARTICLE: HOW ORIGINAL ARE YOU?, BY E. PAUL TORRANCE

Mr. Torrance is a psychologist at the University of Georgia and a leading researcher on creative people. He uses this test to assess originality. People who do relatively well on this kind of originality test and less well on IQ tests are divergers; those who do equally well on the two kinds of tests are all-rounders and those who do better at IQ tests than an originality tests are convergers.

To test yourself, take 10 minutes to write down all the unusual uses you can imagine for junked cars. Try to list at least 12-14 uses.

ANSWER CHECK TO WRITING DOWN USES FOR JUNKED CARS:

Check your answers against the following common replies. Give yourself a score of <u>one</u> for each answer that is <u>not</u> on this list:

- make into an art object
- a pretend car on a kid's playground
- a safety warning for drivers
- plant flowers in it
- sell for scrap iron and spare parts
- smash with hammer for tension remover
- use the tires for a swing
- recap and sell the tires
- make one good car from several junked ones
- chairs
- repair for a demolition derby
- practice car in teaching auto mechanics
- fix up for auto racing
- repair and sell it

REMEMBER: The above answers score zero, all others score one each. If your score is 5 or below, it shows little originality; 6-14 is average; if 15 and above, you're highly original.

NAME_____

CLASS_____

INVENTORS AND INVENTIONS UNIT

Enrichment Work Using the Learning Center

Projects:

1. Ask a student to present a report on the construction of the pyramids.

   A. One or more students could construct one out of paper mache.

2. Have a student report on how circuit breakers, relays, and transformers work.

3. Ask a student to present a report on Enrico Fermi and his contribution to nuclear science.

4. Have one or more students give a report on different or unusual clocks. (cuckoo clocks, pendulum clocks, computer clocks, etc.)

   A. Have them draw a diagram of their own Rube Goldberg clock.

5. Write a report explaining the uses of the astrolabe, the sextant, and the dividing engine. Explain how they functioned . . . use illustrations.

6. Have a few students read up on and discuss how the Industrial Revolution in England affected people's lives.

7. Alessandro Volta (late 1700's) designed the endiometric piston. Discuss how this ultimately led to the invention of the airplane. Be sure to include the discovery of oil.

8. With the help of various illustrations, explain how firearms evolved into their modern form. Trace the modifications from the musket, through the flintlock gun, to the bayonet.

9. Ask the students to trace, in detail,the chain of events from the phonograph through the television.

10. Ask a student to give a report on Thomas Edison that focuses on his inventions.

NAME_____

Matching: Transportation Achievements

Directions: Match the invention or first known use with the dates.

1.	Steamboat	_____ 1869 (by Union and Central Pacific Railroads)
2.	First gas-powered auto (U.S.)	_____ 1914 (connected two oceans)
3.	First to mass produce the auto	_____ caveman (possibly a million years ago)
4.	Conestoga Wagon (U.S.)	_____ 1804, (G.B.) Richard Trevithick
5.	Wheel	_____ 1961 (Russian)
6.	Passenger train service	_____ 1450 (Portugese)
7.	First subway	_____ Wright Brothers (U.S.), 1903
8.	First powered elevator	_____ 1900 (Ger), Zeppelin
9.	Horse-drawn chariot	_____ 1830 (U.S.)
10.	First air-filled tire	_____ 1927 (U.S.), Charles Lindbergh
11.	First known, inventor of compass	_____ 1269 (Fr.), Peregrinus
12.	Erie Canal (U.S.)	_____ 5,000 years ago (1st used by the Summerians)
13.	First steam locomotive on tracks	_____ 1863 (G.B.)
14.	Transcontinental Railroad (U.S.)	_____ 1957 (Russian)
15.	First submarine	_____ 1852 (U.S.), Elisha Otis
16.	First man-made space satellite	_____ James Watt (G.B.), 1769
17.	First passenger balloon	_____ Boyd Dunlop (G.B.), 1888
18.	Litter (used to carry people)	_____ Opened in 1825 (U.S.)
19.	First 3-masted ship	_____ 1912 (U.S.), Henry Ford
20.	First orbit in space	_____ 1783, Montgolfier Brothers (Fr.)
21.	First non-stop solo flight over Atlantic	_____ John Fitch (U.S.), 1787
22.	First successful air flight (plane)	_____ 1620 (Dutch), Cornelies Drebbel
23.	First airship (powered)	_____ 1750, Lancaster County, Pa.
24.	Panama Canal	_____ 1893 (Charles Duryea)
25.	Steam Engine	_____ 3,600 years ago (Egyptians)

NAME_____

CLASS_____

MATCHING: Transportation Achievements

1. 14
2. 24
3. 18
4. 13
5. 20
6. 19
7. 22
8. 23
9. 6
10. 21
11. 11
12. 5
13. 7
14. 16
15. 8
16. 25
17. 10
18. 12
19. 3
20. 17
21. 1
22. 15
23. 4
24. 2
25. 9

NAME_____ CLASS_____

Booklet: The Birth and Babyhood of the Telephone

Directions: The following questions are in chronological order so that the answers will build on one another . . . and be easier for you to locate.

_____ 1. Thomas Watson was forced to leave school at age_____ and go to work.

_____ 2. Bell was living in the city of_____when he invented the telephone.

_____ 3. During the daytime, Bell worked on a system of visible speech which allowed_____ to learn to talk.

_____ 4. The first message of the telephone was,"_____".

_____ 5. In 1876, Philadelphia was having a_____ _____ so Bell set up a telephone exhibit there.

_____ 6. In October, 1876, the first outdoor telephone experiment was conducted over a length of_____miles.

_____ 7. The first telephone shouts were not "hellos" but"_____".

_____ 8. In April, 1877, the first_____telephone line was run between William's office and his house.

_____ 9. Bell's patent number for the telephone was_____.

_____10. Later in life, Bell went to England and did some notable work on _____while Watson turned his attention to battleships.

** This booklet available through your local Bell Telephone System.

NAME_____

CLASS_____

Answer Sheet: Birth of the Telephone

1. 13
2. Salem or Boston
3. deaf-mutes
4. Mr. Watson - come here . . . I want you.
5. Centennial Exposition
6. 2
7. ahoys
8. outdoor
9. 174465
10. airships